AMENDMENTS TO THE DRAWINGS

One sheet of replacement drawing is attached (FIG. 1) in order to properly label the moving image object (31) and the line-shaped image object (30), as set forth in the claims.

REMARKS

The Applicant thanks the Examiner for the thorough consideration given the present application. Claims 1-14 are pending. Claims 1-12 are amended, and claims 13 and 14 are added. Claims 1 and 7 are independent. The Examiner is respectfully requested to reconsider the rejections in view of the amendments and remarks set forth herein.

Allowable Subject Matter

The Examiner states that claim 11 would be allowable if rewritten in independent form, and to include the subject matter of the base and intervening claims.

Applicant thanks the Examiner for the early indication of allowable subject matter in this application. However, claim 11 has not been rewritten in independent form at this time, since it is believed that each of independent claims 1 and 7, as amended herein, is in condition for allowance.

Examiner Interview

If, during further examination of the present application, a discussion with the Applicant's Representative would advance the prosecution of the present application, the Examiner is encouraged to contact Carl T. Thomsen, Registration No, 50,786, at 1-703-208-4030 (direct line) at his convenience.

Drawings

One sheet of replacement drawing is attached (FIG. 1), in order to properly label the moving image object (31) and the line-shaped image object (30) as set forth in the claims. No new matter has been added.

Claim for Priority

The Examiner has not acknowledged the Applicant's claim for foreign priority. Clarification is respectfully requested in the next official communication.

Information Disclosure Citation

The Applicant thanks the Examiner for considering the reference supplied with the Information Disclosure Statement filed September 27, 2007, and for providing the Applicant with an initialed copy of the PTO form filed therewith.

Claim Objections

The Examiner has objected to claims 6 and 12 because of informalities. In order to overcome this objection, the Applicant has amended claims 6 and 12 in order to correct the deficiencies pointed out by the Examiner. Reconsideration and withdrawal of this objection are respectfully requested.

Amendments to the Abstract

The Abstract of the Disclosure has been amended to a size of 150 words or less as is required by USPTO Rules.

Substitute Specification

In accordance with MPEP § 608.01(q), the Applicant herewith submits a substitute specification in the above-identified application. Also included is a marked-up copy of the original specification which shows the portions of the original specification which are being added and deleted. The Applicant respectfully submits that the substitute specification includes no new matter and that the substitute specification includes the same changes as are indicated in the marked-up copy of the original specification showing additions and deletions.

Because the number of amendments which are being made to the original specification would render it difficult to consider the case, or to arrange the papers for printing or copying, the Applicant has voluntarily submitted this substitute specification. Accordingly, the Applicant respectfully requests that the substitute specification be entered into the application.

Rejection Under 35 U.S.C. § 112, second paragraph

Claims 3, 4, and 5 stand rejected under 35 U.S.C. § 112, second paragraph. This rejection is respectfully traversed.

The Examiner has set forth certain instances wherein the claim language lacks antecedent basis.

In order to overcome this rejection, the Applicant has amended claims 1, 3, 4, and 5 to correct each of the deficiencies specifically pointed out by the Examiner. The Applicant respectfully submits that the claims, as amended, particularly point out and distinctly claim

the subject matter which the Applicant regards as the invention. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

Rejections Under 35 U.S.C. § 102(e) and § 103(a)

Claims 1 and 7 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Katoh et al. (U.S. Patent 6,654,495); and

claims 2, 3, 8, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Katoh et al. in view of Fitzpatrick et al. (U.S. Patent 5,262,860); and

claims 4 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Katoh et al. in view of Fitzpatrick et al., and further in view of Bessho (JP 11-265422).

These rejections are respectfully traversed.

Amendments to Independent Claims 1 and 7

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the present application, independent claim 1 has been amended herein to recite a combination of features directed to an image processing method of eliminating a line-shaped image object, which overlaps with a moving image object in one image comprising effective or ineffective pixels, from the moving image object, the method comprising the respective steps of:

a line segment extraction step for extracting a line segment from a line-shaped image object by a line segment extraction means;

an elimination step for eliminating the line-shaped image object from the moving

image object by a line-shaped image elimination means;

a pixel extraction step for scanning a vicinity region of the line segment on the moving image object and sequentially extracting pixels to be scanned by an image scan means;

an effective pixel determination step for determining whether or not the extracted pixels to be scanned are the effective pixels by an effective pixel determination means; and

a pixel interpolation step for dropping a perpendicular from the pixels to be scanned that are determined to be the effective pixels at the effective pixel determination step to a nearest line segment and setting all the pixels on the perpendicular as the effective pixels by a pixel interpolation means.

Independent apparatus claim 7 of the present invention has been amended in a similar manner.

In FIG. 1 of the present invention, the line-shaped object (30) and moving image object (31) and an image are made up of the line-shaped image object and the moving object. And in Fig. 2, illustrates CPU (2) for executing arithmetic processing, a line segment extraction unit (22) of the CPU (2) extracts a line segment from a line-shaped image object (30) in the image at the extraction step (10). Then, a line shaped image elimination unit (23) enlarges the line segment obtained at the above step and removes the line segment from a portion in which at least a moving image object (31) is included in the image (line segment image elimination step (11)). The present invention expresses an

image of a player playing a game on a tennis court as an example. In this case, for example, the moving image object shows a moving image like the player, and the line-shaped image object shows court lines and net lines drawn on the ground. However, when the line segment image is eliminated as described above, since the portion of the line segment image overlapping with the moving image object is eliminated, a band-shaped ineffective pixel portion is made on the intrinsic moving object.

Therefore the present invention has the following steps to interpolate it effectively.

For convenience's sake, Fig. 3 shows an example of the line-shaped image object (30), Fig. 4 shows an example of the moving image object (31), and Fig. 5 shows a state in which the moving image object (31) is segmentized at the elimination step (11). In the respective figures, pixels with "1" show effective pixels, and pixels with "0" show ineffective pixels.

In Fig. 3, band-shaped effective pixels (40) arranged in a horizontal direction are the line-shaped image object (30) as the line-shaped image, and the other regions are the ineffective pixels. Then, a line segment (41) is extracted at line segment extraction step (10).

In contrast, as shown in Fig. 4, the moving image object (31) is composed of a set of multiple pixels (50) ... expressed by "1".

In an actual image, the line-shaped image object (30) overlaps with the moving image object (31), and elimination of the line-shaped image object (30) results in a state

shown in Fig. 5. That is, an ineffective pixel band (60) is made in the moving image object (31), thereby the moving image object (31) is segmentized.

To interpolate the segmentation in the present invention, the pixels in the vicinity of the line segment (41) are sequentially scanned by an image scan unit (24) of the CPU (2), and the pixels within a predetermined threshold value are extracted.

At the time when the line segment (41) is enlarged to a line width of three pixels at the line segment image elimination step (11) (in the cases shown in Figs. 3 to 5), the pixels spaced apart from the line segment by two pixels may be extracted. The to-be-scanned pixels (32) extracted as described above can also be temporarily stored in the memory (3).

Further, as shown in Fig. 6, the pixels (42) on the line segment (41) may be sequentially scanned, screen coordinates (44), (44), (45), (45) (in this case, four types of screen coordinates exist to a single pixel (42)) may be determined by adding and subtracting a value, which is obtained by adding 1 to a size (43) one half the line width, to and from the screen coordinate of the pixel (42), which is obtained each time the pixels (42) are scanned, in the respective directions of x- and y- directions, and the pixels of the screen coordinates may be used as the pixels to be scanned (32).

Then, an effective pixel determination unit (25) determines whether or not the extracted pixels are effective at determination step (13).

As a result, when the pixels are effective (having information of "1"), a pixel interpolation unit (26) drops a virtual perpendicular between the pixels and the line segment (41) at step (14) and converts all the ineffective pixels on the perpendicular into effective

pixels at step (15 sequentially. Processing for making the ineffective pixels effective can be executed by rewriting the information of "0" allocated to the respective pixels to "1".

As is apparent from extraction steps I to V described on pages 17-20 of the present specification, the pixels lost by eliminating the line-shaped image object (30) can be interpolated by repeating the above process, thereby an image very near to the original moving image object (31) can be obtained at a high-speed and with high-precision.

On the other hand, the Examiner has rejected independent claims 1 and 7 under 35 U.S.C. § 102(e) as being anticipated by Katoh et al. (USPN 6,654,495).

Katoh et al. merely disclose a method and apparatus that provide for removing ruled lines from binary image containing character portions and ruled line potions. Katoh et al. disclose the binary image have character portions and ruled line portions. The object to eliminate the image (character portions) of Katoh et al. is different from the object to eliminate the image (moving image object) of the present invention.

Therefore each step in independent claims 1 and 7 is not taught or suggested by Katoh et al.

At least for the reasons explained above, the Applicant respectfully submits that the combination of features set forth in each of independent claims 1 and 11 is not disclosed or made obvious by the prior art of record, including Katoh et al.

Therefore, independent claims 1 and 7 are in condition for allowance.

Dependent Claims

The Examiner will note that dependent claims 2-12 have been amended, and claims 13 -14 have been added.

All dependent claims are in condition for allowance due to their dependency from allowable independent claims, or due to the additional novel features set forth therein.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are respectfully requested.

CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the outstanding Office Action, and that the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, he is invited to telephone Carl T. Thomsen (Reg. No. 50,786) at (703) 208-4030(direct line).

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,
BIRCH, STEWART, KOLASCH & BIRCH, LLP

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Attachments: Substitute Specification,
One Sheet of Replacement Drawings (FIG. 1), and
Revised Abstract of the Disclosure